

The Chemical Basis of Life

Chapter Objectives

Opening Essay

Explain why an understanding of chemistry and the properties of water are important aspects of biology.

Elements, Atoms, and Compounds

- 2.1 Define matter, an element, a compound, and a trace element.
- 2.2 Explain how and why iodine, fluoride, and iron are added to the human diet.
- 2.3 Distinguish between the size, location, and properties of protons, electrons, and neutrons.
- 2.3 Define the atomic number and mass number of an atom.
- 2.3 Define an isotope and explain what makes some isotopes radioactive.
- 2.4 Describe the uses and dangers of radioactive isotopes.

Chemical Bonds

- 2.5 Explain how the electron configuration of an atom influences its chemical behavior.
- 2.6–2.8 Distinguish between covalent bonds, nonpolar polar covalent bonds, polar covalent bonds, hydrogen bonds, and ionic bonds, noting their relative strengths and how and where they form.
- 2.9 Explain the significance of chemical reactions. Identify the reactants and products of photosynthesis.

Water's Life-Supporting Properties

- 2.10–2.13 Describe the special properties of water that make it vital to living systems. Explain how these properties are related to hydrogen bonding.
- 2.10 Define and distinguish between cohesion, adhesion, and surface tension.
- 2.11 Define and distinguish between heat and temperature. Explain how sweating helps to cool your body.
- 2.12 Explain why ice floats.
- 2.13 Define a solute, a solvent, and a solution.
- 2.14 Explain how acids and bases directly or indirectly affect the hydrogen ion concentration of a solution.
- 2.14 Explain the basis of the pH scale.
- 2.14 Explain how buffers function.
- 2.15 Describe the causes and consequences of acid precipitation and ocean acidification.
- 2.16 Explain why the search for extraterrestrial life centers on the search for water.